CLAIMS

1. **(original)** A method of determining the presence of a target analyte in a sample comprising:

a) acquiring a first data image of a random array composition comprising:

i) a substrate with a surface comprising discrete sites; and

ii) a population of microspheres comprising at least a first and a second subpopulation each comprising a bioactive agent;

wherein said microspheres are distributed on said surface such that each of said discrete sites contain no more than 1 microsphere;

b) mapping a grid onto said first data image to create a registered first data image;

c) contacting said random array composition with said sample;

d) acquiring a second data image from said array with said sample;

e) mapping a grid onto said second data image to create a registered second data image; and

f) comparing said first and said second registered data images to determine the presence or absence of said target analyte.

2. **(currently amended)** A method according to claim [[2]] 1 wherein said discrete sites are wells.

3. **(currently amended)** A method according to claim [[38]] 1 or 2 wherein said bioactive agents are proteins.

4. **(currently amended)** A method according to claim [[38]] 1 or 2 wherein said bioactive agents are nucleic acids.

5. **(canceled)**

6. **(original)** A method ~~according to claim 5~~, of signal pre-processing comprising:

a) acquiring a first data image of a random array composition comprising:

i) a substrate with a surface comprising discrete sites; and

ii) a population of microspheres comprising at least a first and a second subpopulation each comprising a bioactive agent;

wherein said microspheres are distributed on said surface such that said discrete sites contain microspheres; and

b) determining the similarity of a first signal from at least one discrete site to at least one reference signal, wherein said determining comprises obtaining said first signal from said at least one discrete site and comparing said first signal to a threshold similarity measure obtained by comparing a reference signal to a theoretical signal, wherein when said first signal is within said threshold similarity measure, said first discrete site contains a bead.

7. **(original)** A method according to claim 6 wherein when said first signal is not within said threshold similarity measure, said first discrete site does not contain a bead.

8. **(original)** A method according to claim 7 wherein when said first signal is not within said threshold similarity measure, said first discrete site contains a defective bead.

9. **(original)** A method according to claim 7 or 8 further comprising disregarding said discrete site wherein said first signal is not within said threshold similarity measure.

10. **(currently amended)** A method according to claim [[5]] 6 wherein when said first signal is within said threshold similarity measure, said first discrete site contains a bead that comprises an optical signature that is similar to said reference signal.